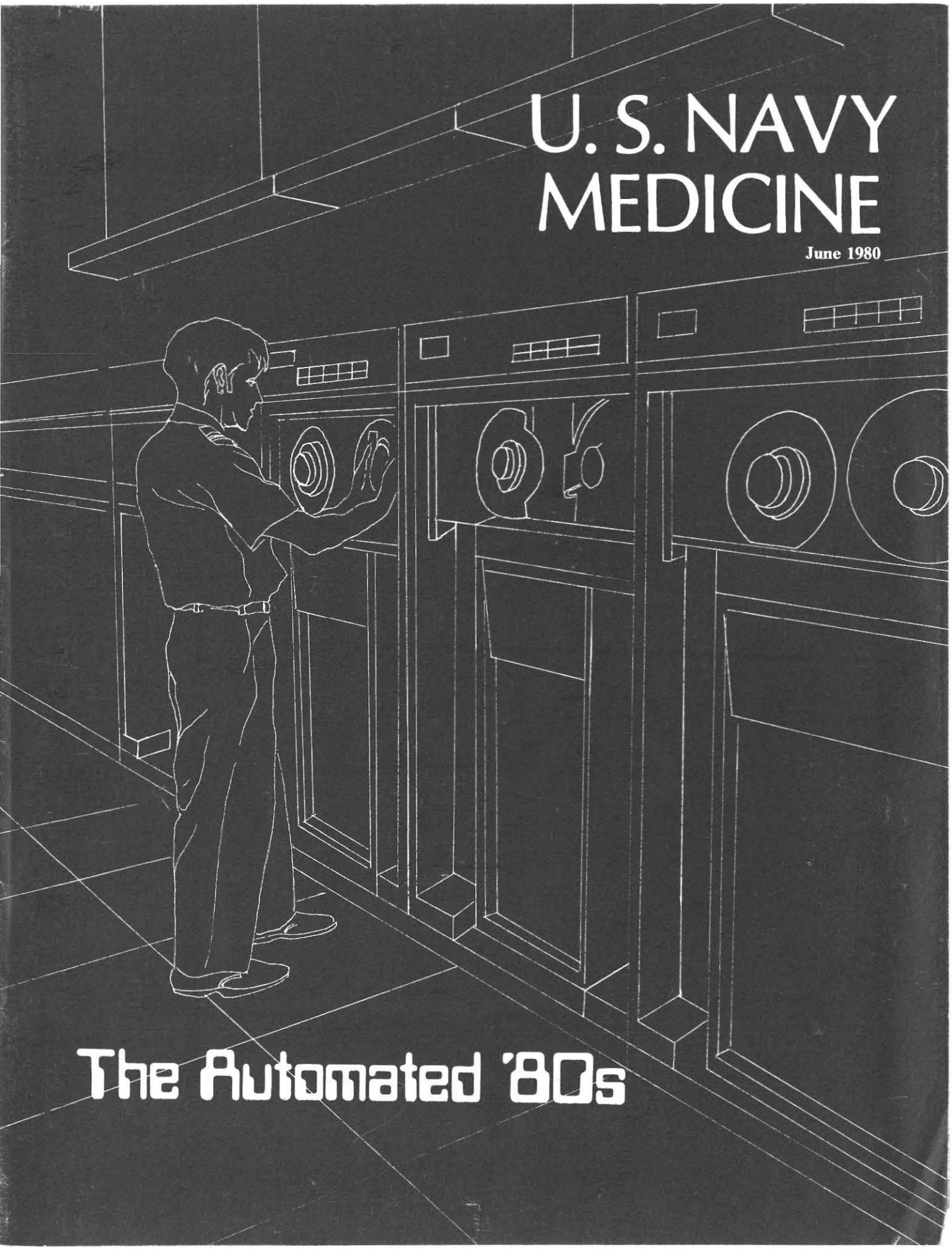

U.S. NAVY MEDICINE

June 1980

The Automated '80s

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COVER: A computer specialist changes a reel of tape at the Naval Medical Data Services Center, Bethesda, MD. The use of computer technology has more and more become a way of life in hospitals, clinics, and in the management of health care systems throughout the world. What the Navy Medical Department is doing to modernize itself as it enters a new decade is the subject of this month's issue. Cover art by Juanita Adams.

Automation—An Opportunity for the 80s

The Navy Medical Department has continually undergone change during its long history—in our time we have witnessed numerous changes in the practice of medicine and dentistry and the administration and management of our health services. We are, therefore, no strangers to change and its effects. Now, however, as we move into the 1980s we are about to participate in another exciting change, and this change is associated with the complete introduction of automation into our everyday working lives. I say complete because we have not taken full advantage of available technology to assist us in the management of our information resources and to relieve our clinical and administrative staffs of the numerous labor-intensive functions long overdue for automating.

It is time for all of us to recognize that information is one of our most important resources. I rank it in importance with our human, financial, and facility resources. In our work, information assumes an additional dimension in that clinical information becomes all important to patient care. In spite of its importance, however, we are not doing our best in managing our information resources, and that goes for clinical as well as management information.

Historical information that tells us where we have been is no longer sufficient to direct and manage the delivery of health services. We must have the capability to develop alternative answers to the many "what if" questions which confront our managers and clinicians daily. The computer properly introduced and applied, will not only help control and manage our information, but will also provide opportunities to improve the quality of our services. This is true in clinical as well as administrative areas. For instance, we have proof of positive results with our automated pharmacy at NRMC Charleston, automated clinical laboratory at NNMC Bethesda, automated radiology service at NRMC San Diego, automated hypertensive/diabetic clinic at NRMC Oakland, and a computer supported cardiology system at NRMC San Diego. Our CAT (Computerized Axial Tomography) scanners are proving to be invaluable as a diagnostic tool. We are launching a major effort to upgrade computer support in administrative areas. We will be replacing antiquated computers with modern systems capable of addressing the "what if" questions of our managers. Word processing systems are beginning to demonstrate how antiquated we really are in the handling of data and information. We are evaluating Data Base Management Systems. We have developed the capability and are telecommunicating from computer at five of our NRMCs to the computer at the Naval Medical Data Services Center, Bethesda. We have only begun to scratch the surface of automated support, but the future is promising if we adapt to the changing environment.

The time has long passed when we looked to the computer for sole support of one functional area. We must give information management the attention it warrants in all echelons and functions of our organization. A more complete introduction of automation in the Navy health care system, therefore, must become a primary responsibility and high priority of both clinical and administrative management. Management must become aware of and sensitive to the numerous opportunities of automation and must press strongly for that support in every appropriate echelon of our organization. We cannot lag in our enthusiasm to explore these opportunities, particularly at this time when our nation's medical, nursing, and business schools and medical centers are teaching and advocating delivery and management of health care via computer support systems. Those of you in top clinical and management positions should make every attempt to become familiar with the fundamentals and opportunities of automation. You should insist that your staffs do likewise. This can be accomplished through courses, seminars, and review of applicable literature. All of you—physicians, dentists, administrators, and nurses, both military and civilian, must seek out and request courses and seminars that will provide you an awareness and general knowledge of the advantages of automation. You must do this now if you are to support and be supported by the changes and opportunities of automation that are certain to materialize during the 1980s.

Get involved. Our future depends on your involvement. It has been said that those organizations, whatever their mission, that will survive in the 1980s will be the organizations that effectively manage their information resources. I believe this is true and I believe one way we will effectively manage our information resources, both clinical and administrative, is through management's effective implementation of the opportunities of automation.

W.P. ARENTZEN
Vice Admiral, Medical Corps
United States Navy

The Medical Department Automatic Data Processing Program

LCDR Steven L. Smith, MSC, USN

The development of the Automatic Data Processing (ADP) program within the Medical Department closely parallels the growth of automation in any large and complex industry. We are not unique. From beginnings as an electric accounting machine shop under the operational control of the Fiscal or Comptroller Division, the program has grown and matured, although not always at a steady rate, to its present state.

The Naval Medical Data Services Center (NMDSC), in conjunction with the Management Information Systems Division of BUMED and the Director of Navy TRIMIS, functions as the program manager for ADP within BUMED. NMDSC was established on 1 July 1965 as a command under an officer-in-charge. The command combined the staffs of the Data Processing Division, BUMED, and the Data Systems Department of the National Naval Medical Center. In May 1966, the procurement of a UNIVAC 418-II computer was approved by the Secretary of the Navy for use by BUMED and NMDSC. This computer was installed in July 1966 and served as the main central processing unit for BUMED, NNMC, and NMDSC until 1976, when an IBM 360/50 computer was installed as an upgraded replacement. NMDSC is currently working on the documentation of workload requirements and justification for another upgrade of the in-house computer capability.

The evolution of ADP support at naval hospitals and regional medical centers has followed a similar, but slower, path. NARMC Pensacola obtained a UNIVAC 418-II computer shortly after NMDSC and used it as its workhorse until 1976 when it acquired the Interdata 7/32 minicomputers. Our other facilities were not as lucky, and operated with EAM equiment until the early 1970s when 12 IBM 1401 computers were acquired. These 1401s, although of considerably greater capability than the EAM equipment they replaced, were essentially outdated when installed.

In 1976, five of the Interdata minicomputers were procured and placed in the teaching hospitals of Portsmouth, San Diego, and Oakland as well as Pensacola and Great Lakes. This gave all our facilities, except those overseas, in-house computer capability. Figure 1 currently represents the status of the facilities.

The staffing picture within the ADP program has remained fairly constant. Currently, there are 208 civilian employees and 34 military (both officer and enlisted). This represents a very dedicated and professional staff that often has had to work extra hard to overcome the deficiencies of our hardware configurations.

Of special interest is the growth in professionalism of the cadre of officers within the program. Eighteen of these officers have graduate degrees of which 10 have their degree in the area of information systems/computer management/ management information systems.

As the Medical Department moves into the 1980s, there will be an increased emphasis on automated systems, including clinical systems. To meet this emphasis, NMDSC and BUMED are beginning to place greater importance on the training of the ADP staffs and the upgrading of technical skills in areas of analysis, programming, telecommunication, and data base management.

Management Plan

The BUMED ADP program has not been a complete hit or miss affair. In 1970, the Navy Medical Information System (NAVMEDIS) plan was published as a BUMED instruction. This plan was an extremely comprehensive and forward-thinking document. It recognized the trends of the future, the needs of users, and the state-of-the-art in technology. In short, it was an excellent plan, but, for many reasons, was not completely imple-

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r. entable. Portions of the program as outlined in NAVMEDIS were pilot tested; some were implemented, but a great majority were allowed to "wither on the vine." This was an unfortunate state of events and, to some extent, we are all now paying the price for the withering vine. The NAVMEDIS was cancelled in 1976.

In July 1979, the ADP program got a tremendous boost through the development of the Medical Services input to the Navy Long-Range ADP Plan. This plan was developed at NMDSC, approved by the Surgeon General of the Navy, and submitted to CNO via the Office of the Surgeon General at OPNAV (OP-093). Figure 2 summarizes the Medical Services input. Using this plan as the objective that needs to be attained, work began on developing a new and implementable master plan to act as the management document for the program. Work has been completed on the Naval Health Care Information System (NAVHCIS) master plan and it should be published soon as BUMED Instruction 5200.10.

Future Plans and Initiatives

The future of the Medical Department's ADP program is brighter now than it has been for a long time. A refined set of requirements exist and new initiatives have been made. Among these are:

FIGURE 1. Hardware Configurations

Site		Hardware
NMDSC		IBM 360/50
NRMC	Portsmouth	Interdata 7/32
	San Diego	
	Great Lakes	
	Oakland	
NARMC	Pensacola	
NRMC	Charleston	IBM 1401
	Camp Lejeune	
	Orlando	
	Jacksonville	
	Memphis	
	Philadelphia	
	Corpus Christi	
	Long Beach	
	Bremerton	
	Camp Pendleton	
NRMC	Okinawa	Shared IBM 1401 with Fleet Activities, Okinawa
NRMC	Guam	IBM 407 (EAM)

- **Uniform Chart of Accounts.** The requirements of this system are driving a hardware procurement effort that, hopefully, will serve as the means of replacing the antiquated IBM 1401 systems and provide in-house ADP capability at the overseas hospitals and regional medical centers.

- **Development of standard application systems, central design and programming.** The advantage of standard application systems running at all our medical facilities has long been recognized. The Surgeon General has directed the development of standard systems and, to this end, NMDSC is beginning to devote increasing numbers of resources. A lead programming activity for the Interdata 7/32 minicomputer has been operating for a year. The BUMED Information Systems Policy Board will be addressing the functional areas of standard systems design. Currently, the inventory of standard systems is small (Occupational Safety and Health, Inpatient Accounting).

- **The upgrade of the NMDSC computer.** The requirements and justification for this upgrade have been submitted to the Naval Data Automation Command for review and approval. This upgrade will give NMDSC the ability to run all applications in-house and provide the needed additional capacity to support up to 45 on-line users, a telecommunication network with the field activities, a data base management system, and other software packages for use by Medical Department managers and researchers.

- **Integration of TRIMIS applications and staff.** Clinical applications developed through the TRIMIS pro-

FIGURE 2. Requirements Summary

MISSION SPONSOR **OP-093** FUNCTIONAL AREA **Medical Services** EXPECTED RESOURCE SPONSOR(S) **OP-093**

AIS/Requirement Name/Short Title	Needed by Fiscal Year	Responsible Echelon 2 Command	Interfaces with Other Functional Areas	Expected User Commands/Activities
Replace IBM 1401 Computers	FY81	BUMED	Financial Management Administration Five-year Defense Plan Management Manpower/ Personnel/ Training Material Shore Facilities Safety Strategic Planning Legal Reserve Affairs RDT/E	Naval Hospitals Regional Medical Centers Medical Centers Medical R&D Activities Bureau of Medicine and Surgery Fleet Hospitals Regional Dental Centers
Develop Telecommunications Capability	FY80-FY83	BUMED	As Above	As Above
Increased ADP Funding Support	FY80-FY87	BUMED	As Above	As Above
Develop an integrated Data Base managed by a DBMS	FY81-FY83	BUMED	As Above	As Above
Develop additional standardized application systems for health care administration	FY83	BUMED	As Above	As Above
Integration of TRIMIS Systems	1985	BUMED	As Above	As Above
Development of greater analytic tools for use via computer	1983	BUMED	As Above	BUMED (only)

FIGURE 2. Requirements Summary (Continued)

MISSION SPONSOR **OP-093** FUNCTIONAL AREA **Medical Services** EXPECTED RESOURCES SPONSOR(S) **OP-093**

AIS/Requirement Name/Shore Title	Needed by Fiscal Year	Responsible Echelon 2 Command	Interfaces with Other Functional Areas	Expected User Commands/Activities
Source Data Automation at all levels of the Medical Department	1983	BUMED	As Above	As Above
Improved accuracy of data	1983	BUMED	As Above	As Above
State-of-the-art computer capability at overseas hospitals/ regional medical centers	1982	BUMED	As Above	As Above
Upgrade of BUMED (NMDSC) in-house computer capability	1981	BUMED	As Above	BUMED (only)

gram are beginning to come on line. Along with the systems comes the necessary staff to operate them. Both systems and staff are being integrated into the existing ADP division or department within the medical activities. This integration is a necessary step in insuring that there is a professional management staff at each activity to manage this fourth, and very important, command resource. This resource is the information that is both collected and produced by all the automated systems (administrative and clinical) that the hospital managers have available to them. As the Surgeon General said, this information resource ranks just as high in importance as finance, personnel, and physical plant.

Summary

As previously stated, the future is bright for the BUMED ADP program. The professionals working in this area, both military and civilian, are making significant contributions to the better management of the health care delivery system and this is reflected in the improved quality of health care being delivered. These professionals are no longer just "machine jockeys," and no longer can just any officer be tasked with managing the ADP shop. These people are information managers, combining expertise from the management sciences, computer engineering, electronics, and health care administration. Efforts are currently underway to change the names of the ADP division/department to Information Systems division/department in order to reflect the expanded scope of their responsibilities.

The telecommunications network with the Interdata 7/32s is established and working better every day, the prospect of installing more state-of-the-art computer hardware is good, the use of dedicated microcomputers for use in specific areas is almost a reality, and the development of standard application systems is progressing. The program has come a long way since the establishment of NMDSC in 1965, but there is still a long way to go. The goals have been established and the forward pace is constant and steady in reaching them. □

TRIMIS: The Tri-Service Medical Information Systems Program

During the early 1970s, the medical departments of the three services each were pursuing design and development of clinically related automated systems independently. In November 1973, the Defense System Acquisition Review Council (DSARC), concluded that significant duplication existed in the area of medical computer support development. The DSARC recommended that the efforts of the three military medical departments to develop automated medical information systems be consolidated into a single tri-service program. The program would develop standard systems which could be adapted to the various sizes and types of medical activities and facilities within the Department of Defense. During the next several years, various attempts were made by DOD and the service medical departments to develop an effective program, but with limited success. On 11 June 1976 the present TRIMIS Program and the TRIMIS Program Office (TPO), a field activity of the Office of the Assistant Secretary of Defense for Health Affairs, were established by DOD Directive 6000.5. The mission of the TPO, as delineated by the directive is to:

- Improve the effectiveness and economy of health care delivery through the application of standardized ADP (Automated Data Processing) techniques to health care support systems.
- Centralize and coordinate the application of state-of-the-art technology and the development of standardized automated systems designed to meet tri-service functional requirements in the medical area.
- Adapt advanced data automation technology to health care delivery, and streamline, modernize, and standardize DOD medical information systems.

The Navy Medical Department had identified the benefits to be derived from automated support in health care delivery prior to the establishment of the TRIMIS Program and was addressing this area through the Clinical Projects Office of the Naval Medical Data Services Center, Bethesda, MD. In December 1976, the Surgeon General redefined the Clinical Projects Office as the Navy TRIMIS Office (NTO) and appointed a Director for the Navy TRIMIS Program. Organizationally, the directorship of the program is lodged in BUMED (MED 01). The Navy TRIMIS Office staff has remained at and continues to be an integral part of the Naval Medical Data Services Center. The staff includes MSC officers, a Nurse Corps officer, civilian computer specialists, program managers, and administrative support personnel. In addition to the full-time staff, the Navy TRIMIS Office is supported by "functional specialty advisors" who provide the NTO with professional advice and guidance regarding the need and appropriateness of automation in specific clinical and administrative areas. For instance, the NTO receives guidance and direction from Surgeon General specialty advisors in areas of pathology, radiology, pharmacy, cardiology, clinical research, nursing service, patient affairs administration, logistics, financial management, etc. In other words, the Navy TRIMIS Program attempts to respond to the expressed needs of these specialty advisors who represent the Surgeon General in their specialized areas.

The mission of the NTO is to plan, program for, and develop, with the DOD TRIMIS Program Office, Surgeon General-approved TRIMIS systems. The NTO provides Navy Medical Department representation at the DOD (TRIMIS Program Office) level in meeting the TRIMIS Program mission. The NTO serves as the focal point within the Navy Medical Department for all TRIMIS related projects, both ongoing under TRIMIS auspices, and under development or proposed by the Navy for TRIMIS Program Office consideration.

In July 1978, the Navy TRIMIS Office (West Coast) was established at NRMC San Diego. Its function is to:

- Represent the NTO on a local and regional basis (DOD Regions 1, 2, 3, 4, and 5) with respect to the overall NTO mission.
- Provide a channel of communications to the NTO for local and regional TRIMIS systems.
- Serve as the contact point for local and regional medical treatment facilities relative to ongoing and planned TRIMIS projects.

The Director of the Navy TRIMIS Office is CAPT Lewis E. Angelo, MSC, USN. The Deputy Director is F.C. Sandquist, a computer systems administrator. The TRIMIS Office is located in Bethesda, MD 20014.

Planning for and successfully installing automated systems within our medical treatment facilities requires the closest cooperation and active participation of all staff members of a facility. Since this is a new endeavor for Navy medicine, we do not have sufficient numbers of computer-oriented personnel. This is being corrected for those commands scheduled to receive automated systems within the near term of one to three years; civilian ceiling points, with TPO funding, have been given to these commands to hire computer specialists, operators, and management analysts. These new personnel will be integrated into the command's ADP divisions. However, of equal importance is the need for hospital staff members to become intimately involved with the preparations for and operation of those automated systems in their specific areas. This involvement under a teamwork concept is absolutely essential. Without it and top level management support, failure will be certain.

Funding

The TPO provides operation and maintenance funding to the services to support the various functions of the program. Pay for a limited number of civilian personnel associated with the ADP portion of the program is funded by the TPO. However, programming for the civilian ceiling points and military billets, as well as funding military pay, is the responsibility of the services. Essentially, the TPO pays for the development, procurement, installation, and, for the present, operation of all TPO-approved automated systems within the three military medical departments.

The Navy has a number of TRIMIS-supported automated systems operating and, in conjunction with the TPO, a number of systems are planned for our facilities during the 1980s. TRIMIS operational systems within the Navy are:

NRMC San Diego
Automated Radiology
Computer Assisted Practice of Cardiology (CAPOC) (ECG Analysis)
Automated Pulmonary Function System

NNMC Bethesda
Clinical Laboratory
Automated Medical Health Testing (AMHT)

NRMC Charleston (NH Beaufort)
Automated Pharmacy System
Patient Registration, Admission, Discharge, Transfer (R/ADT) Module

NRMC Oakland
Hypertensive/Diabetic Clinic
Interim ECG Analysis Support

NRMC Portsmouth, VA
Interim ECG Analysis Support

In response to the Surgeon General's expressed, urgent need for automated support in radiology, pharmacy, clinical laboratory, and patient appointment scheduling areas, the TPO established a Short Range Plan (SRP). Procurement actions are underway for these SRP systems. The present installation plan for the SRP systems in Navy medical treatment facilities during the 1980s is:

Clinical Laboratory (TRILAB)
NRMC Oakland - FY81 (Prototype)
NRMC San Diego
NRMC Portsmouth, VA
NRMC Camp Pendleton

Radiology (TRIRAD)
NRMC Portsmouth
NNMC Bethesda
NRMC Oakland
NRMC Long Beach
NRMC Jacksonville

Pharmacy (TRIPHARM)
NRMC Portsmouth, VA
NRMC San Diego
NNMC Bethesda
NRMC Oakland
NRMC Camp Pendleton

Patient Appointment Scheduling (TRIPAS)
NRMC Portsmouth, VA
NRMC San Diego
NNMC Bethesda
NRMC Oakland
NRMC Camp Pendleton

Two other projects are scheduled for Navy medical treatment facilities through 1984. CAPOC will be fully implemented providing a nationwide network of ECG analysis support for all three military medical departments. Automated Cardiac Catheterization Laboratory Systems (ACCLS) are scheduled for installation at NRMC San Diego (FY81), NRMC Portsmouth, and NNMC Bethesda. Additionally, committees within the three services and the TPO are in various stages of developing plans and specifications for automated patient administration (TRIPAD), food service (TRIFOOD), logistics (TRILOG), and medical records systems. Future articles will address these and other aspects of the TRIMIS Program. □

TRI-RAD

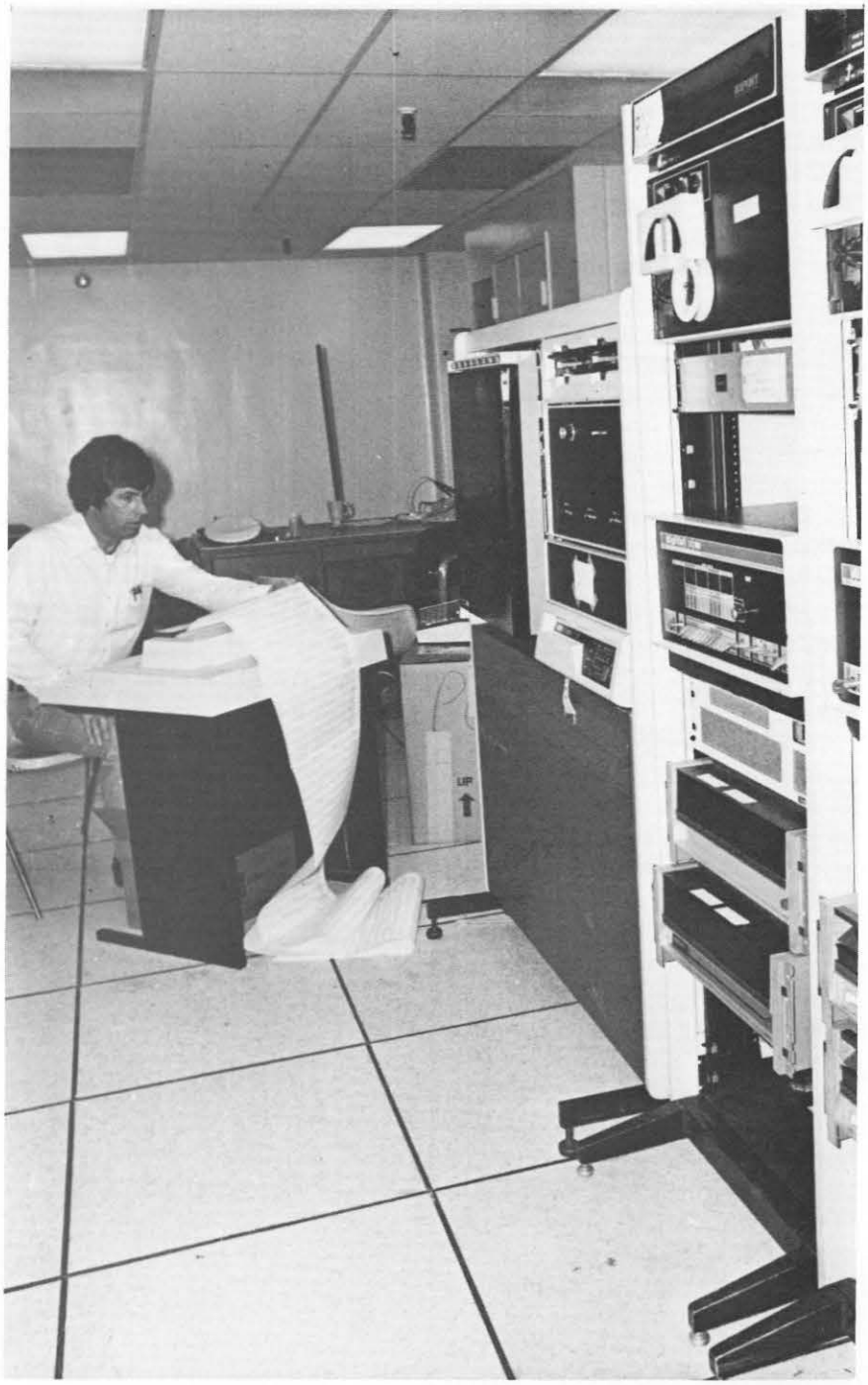
Automation in Support of Radiology Department Management

James C. Rearden
CAPT John P. Smith, MC, USN

In September 1977, the TRIMIS Program Office (TPO), in conjunction with the medical departments of the Navy, Army, and Air Force, identified and validated the requirements for automated support in the radiology departments of military medical treatment facilities (MTF). As a result of this action, the TPO requested that each service nominate two individuals to serve as members of the Department of Defense committee tasked with identifying and developing requirements for the automation of functional areas within radiology departments. The service nominees were to include a functional area specialist and a computer specialist with experience in medical information systems. The Tri-Service Radiology committee, later known as TRI-RAD, was convened in November 1977.

Objectives

The principal objective of the Radiology Management Information System, as identified by the TRI-RAD committee, is to improve the



Minicomputer system supports radiology department at NRMC San Diego.

Mr. Rearden is a computer specialist on the staff of the Navy TRIMIS Office and is the TRI-RAD Project Manager for BUMED.

Dr. Smith is Chief, Radiology Service, NNMC Bethesda, MD 20014 and a BUMED medical representative on the TRI-RAD committee.

performance of radiology service within the medical treatment facilities and thereby enhance patient care. The following specific objectives of the system were established:

- Reduce patient waiting times by scheduling all examinations and tracking patient flow through the radiology department.
- Reduce report turnaround time.
- Make the diagnostic reports more accessible to the referring physician.
- Prevent erroneously ordered duplicate radiology examinations, thus reducing patient exposure and workload.
- Make possible more efficient use of radiology personnel and equipment.
- Improve the availability of recent and prior patient films.
- Reduce the number of lost, misplaced, or out-of-file films.
- Reduce lost time due to erroneous scheduling of conflicting procedures.
- Provide accurate and timely information for use in the management of the radiology department and the medical treatment facility.

The TRI-RAD committee wrote functional requirements for the automated radiology system and they were endorsed by the surgeons general of the armed services in the spring of 1979. The requirements package was then forwarded to the Assistant Secretary of Defense (Health Affairs) for review and final approval.

Currently, the Air Force Computer Acquisition Center (AFCAC), Hanscom Field, MA, is preparing the solicitation package for procurement of the Radiology Management Information System. The contract for the automated radiology system is scheduled to be awarded in the fall of 1980.

Systems Description

The Tri-Service Radiology Management Information System (TRI-RAD) is composed of six separate functional modules, each of which is linked to a common data base. These modules include:

- patient registration
- radiology exam scheduling
- diagnostic reporting
- film file room management
- administrative and statistical reporting
- radiology teaching file

Patient Registration. The patient registration module facilitates the on-line entry of basic patient demographic information into TRI-RAD. This data includes patient name, identification number, inpatient register number (if applicable), birthdate, sex, race, address, and phone number. The patient record created through the registration process will be permanently stored in TRI-RAD until purged after a specified period of inactivity. On subsequent visits to the radiology department, the reception clerk will enter only the patient name or number. The patient record and exam history will then be displayed on the terminal. If the patient demographic data has changed or is incorrect, the receptionist will make the necessary corrections, again using the display terminal. Immediate access to a patient's radiology history will eliminate the time currently spent leafing through radiology round files and marrying patient records with patient exam histories. Automated printing of identification labels will eliminate this laborious and time-consuming chore.

Exam Scheduling. The majority of patients seen by diagnostic radiology services are nonscheduled. Lack of patient scheduling severely limits the ability to make maximum use of radiology department resources, such as medical/capital equipment and personnel. The exam scheduling module, as part of the total TRI-RAD system, will not only allow the scheduling of patients for a particular time and day, but also the scheduling of examination rooms or room groups best suited for specific examinations. The exam schedule may be divided into time groups for patient types, e.g., inpatient and outpatient, and the exams to be performed during those time-groups. In most instances, emergency examinations can also be scheduled.

In the scheduling of multiple exams, contrast media restrictions will be taken into consideration by TRI-RAD in order to schedule the exams in the most expeditious sequence. Duplicate exams will be avoided through a system check of the patient exam history to determine if similar exams have been performed recently.

Scheduling of the majority of exams will reduce patient waiting times, reduce duplicate exams, and permit more efficient use of resources. The scheduling function may be modified to include a method for tracking patients through the department. Failure to complete an examination within a prescribed time will automatically be brought to the attention of the floor supervisor for investigation and correction.

Film File Management. The film file management module provides two capabilities—file room management and film file tracking and loan. Both of these capabilities support the principal goal of the film file room which is to locate and retrieve master folders in a timely and convenient manner.

A major concern in all radiology departments is control of film jackets borrowed from the film library. The TRI-RAD system as-

sists in the control of film jackets by creating a bar code label which is affixed to each film jacket when it is borrowed. As the folders move to various locations within the radiology department, bar code reading light pens situated in offices and reading rooms throughout the department read the bar code labels. Scanning the bar code enters the film jacket's new location into the system. If the jacket is to go outside the department, the film room clerk will enter the name, location, and phone number of the eligible borrower into the system. In either case, inquiries regarding the film jacket's location can be made easily through the film library display terminal.

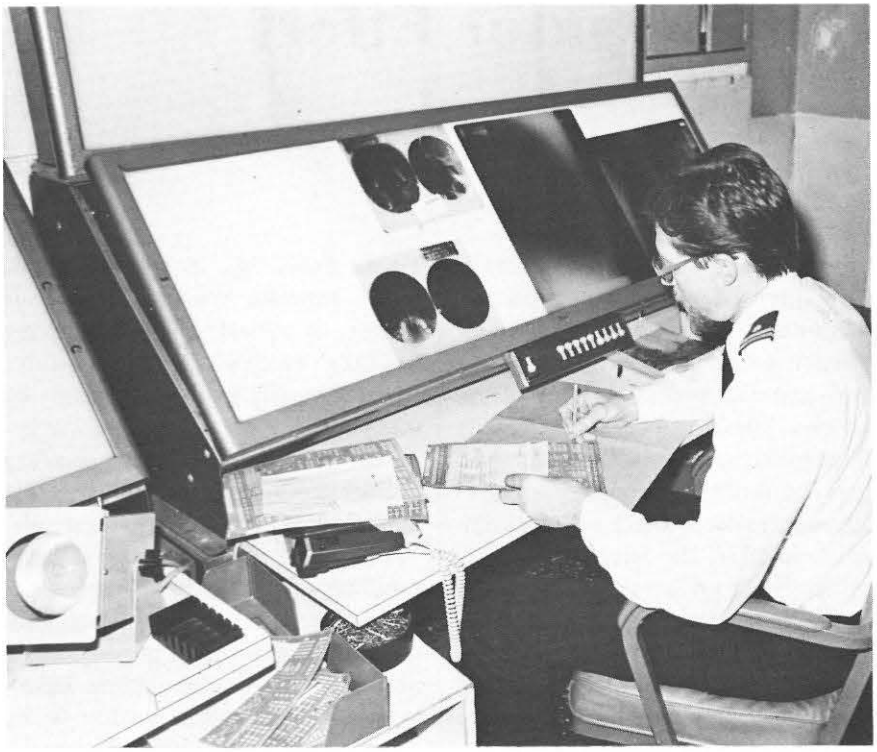
The TRI-RAD system will also generate lists of jackets which have been inactive for a specified time. This allows the file room manager to archive and salvage films on a weekly, monthly, or quarterly basis. The system will also provide lists of overdue film jacket loans and delinquency notices if required.

Diagnostic Reporting. A viable and accurate method for on-line entry of diagnostic reports has proven to be a significant challenge to the major automated radiology system vendors. It is in this module that radiologists experience their most direct interaction with the TRI-RAD system and the personal preference of the radiologist in their diagnostic reporting becomes a major concern.

To date, four automated approaches to diagnostic reporting have proven successful:

- The transcriptionist enters the dictated report into a central recorder. The report may be displayed and edited by the radiologist prior to printing if desired. The total report remains in the system, readily available for display or printing for a specified period of time, normally from 8 to 10 days.
- The second method utilizes a diagnostic reporting terminal with a touch-sensitive screen. The radiologist creates the diagnostic report by probing the screen with a finger or light pen as appropriate words or phrases are displayed. As the radiologist "zeros in" on the diagnosis, the screen display becomes more specific. This approach is currently used by the Siemens TCI system and is in limited operation with the CGR Medical Corporation system.
- A widely accepted but less flexible approach, is the Stored Radiology Text technique used by the CGR Medical Corporation and under development by the National Computer System (NCS) MAXIFILE/RAPORT module. The concept for this method of diagnostic reporting is to associate a "canned report" to a specific bar code label. Each radiologist is able to construct a set of personalized "canned reports." When interpreting an x-ray (if an appropriate canned report is available) the radiologist, using a bar code reader, reads the bar code associated with the report. The report is then displayed on a terminal for editing of the text.
- The fourth method of automated diagnostic reporting is the use of optical mark-sense coding. This approach is currently applied in the RAPORT module of the National Computer system. In this mode, the radiologist selects the appropriate mark-sense form for the examination and completes it by marking the appropriate phrase, word, or text (similar to a machine-corrected

Bar code reading light lends, transfers, and tracks x-ray film throughout medical facility.



After reading an x-ray film on the viewbox, a radiologist records a diagnostic impression on a mark-sense form. The form is optically scanned and the computer automatically produces a complete final report.

examination). The mark-sense form is then read through a mark-sense document reader and the report is produced. This RAPORT system has been operational at NRMC San Diego since 1975.

The TRI-RAD systems will provide both on-line transcription and editing of the diagnostic report and one of the other automated diagnostic reporting techniques outlined above. Transcription will continue to play a part in the creation of some reports; however, most reports will be entered on-line into the system with minimal clerical assistance. Reports processed in this manner will be printed and made immediately available to the radiologist and referring physician.

Radiology Teaching File. The TRI-RAD system will store a record of films selected as teaching cases. These cases will be categorized according to the American College of Radiology (ACR) code. Upon request, the system will display or list all patient films applicable to the retrieval code.

Administrative and Statistical Reporting. The radiology department produces a number of administrative, statistical, and workload reports used in department management and to fulfill medical treatment facility and BUMED reporting requirements.

In support of this function, the TRI-RAD system will produce the following on a daily, weekly, monthly, or quarterly basis:

- Departmental schedule by patient, exam room, exam, date, and time
- Individual exam room schedule
- Film library pull list
- Individual patient schedule
- Flash cards, folder and exam labels required for a patient exam
- List of patient film folders to be salvaged or transferred
- Delinquent borrowers list
- Bar code labels for loan folders
- Workload report by procedures performed and total weighted value
- Workload report by exam room and by requesting location or service
- Film utilization report
- Patient no-show report
- Training reports

The initial phase of the TRI-RAD procurement (Phase 1) includes the installation of automated radiology systems in 15 DOD medical treatment facilities over a five-year period. The Navy MTFs scheduled to receive TRI-RAD in Phase 1 are NRMC Portsmouth, NNMC Bethesda, NRMC Oakland, NRMC Long Beach, and NRMC Jacksonville. NRMC San Diego is in the process of upgrading the RAPORT system to include the TRI-RAD functional capabilities not provided with the original base system. Phase 2 of the TRI-RAD procurement will commence two years after the Phase 1 contract award and will deliver systems to NARMC Pensacola, NRMC Camp Lejeune, NRMC Camp Pendleton, NRMC Charleston, and NRMC Bremerton.

TRI-RAD is a multifaceted radiology support system with the potential of vastly improving health care delivery in the radiology departments of the naval regional medical centers. However, the system requires true management support and involvement. When these elements are provided, and TRI-RAD is truly integrated into the administrative and clinical functions of the radiology departments, this dynamic and flexible system will provide a valuable resource for the managers of today, who are faced with rising workloads and shrinking resources. □

Navy Pharmacy's Computer Effort

LCDR John T. Nazzaro, MSC, USN

Pharmacy, as with many other segments of Navy medicine, has endured personnel cutbacks in recent history. Generally accompanying these cutbacks have been workload increases, many of them coming in the inpatient pharmacy area with the advent of unit-dose drug distribution systems, intravenous admixture services, and the need for more clinical interaction between the pharmacy and other members of the health care delivery team.

There has also been an increasing number of total outpatient visits in the outpatient pharmacy area. Even as all this has occurred, fiscal resources to manage the increased workload have decreased. The trend seems clear: In the future we will be expected to do more with less. All too many of our Navy pharmacies might best be described as "pill mills" set up to get the medication to the patients quickly with little professional clinical involvement, the quality of service being measured solely in "waiting time." The situation has created a challenge for Navy pharmacists, a challenge to provide complete pharmaceutical service to inpatients as well as outpatients while maintaining high levels of quality care and controlling costs.

Quality pharmaceutical care should include, but is not limited to, patient drug profiling, potential drug interaction review prior to prescription dispensing, and a review of each prescription order to detect and prevent potential allergic reactions. This type of care is virtually impossible in any high volume pharmacy without significant personnel augmentation or mechanical assistance. In 1977, the Surgeon General of the Navy endorsed and strongly supported a proposal by the Tri-Service Medical Information System (TRIMIS) group of DOD to test the feasibility of computer assistance within a military pharmacy.

On 1 Oct 1977, the main hospital of NRMC Charleston, became the test site for a total pharmacy computer effort. The system that was installed, with the financial support of TRIMIS, was a commercially available, pharmacy-dedicated system. After a period of two months, during which data bases were constructed and pharmacy personnel had become familiar with the system, the first outpatient prescription was processed by computer.

Since December 1977, all prescriptions (in excess of 750,000) have been processed using computer assistance. The computer took on a regional interservice, outpatient configuration in April 1978, when system installations were made at the USAF medical facility, Charleston, SC, and two branch dispensaries within NRMC Charleston. With subsequent expansions to the Naval Hospital, Beaufort, in June 1979, Dwight David Eisenhower Army Medical Center, Fort Gordon, GA, in October 1979, and USAF Regional Medical Center, Shaw Air Force Base, SC, in October 1979, most patients within a 100-mile radius of Charleston, SC, using military medical facilities, have their prescriptions processed by computer.

All military patients' profiles within the South Carolina area are stored in a common patient file. Whenever a prescription is filled at a military medical facility using the computer, it becomes a permanent part of a total medical profile for the patient. The common patient file allows the medication profile to be common for all facilities. The benefit of this is that these common patient profiles are accessible for any user of the system, and can be reviewed by the computer whenever a prescription is filled at any facility. A part of the review includes one for drug overlaps. A drug overlap is identified as an exact duplicate of the medication and/or therapeutic class. This review readily identifies the "shopper" going from facility to facility as well as the patient who is overmedicating himself either because he is seeing multiple practitioners or misunderstands the practitioners' instructions.

The system automatically (as part of prescription processing) reviews all prescriptions for drug-drug interactions and potential drug allergies. This review of the new prescription orders is compared against all active prescription orders in the patient's profile. The pharmacy has been able to intervene on many occasions concerning a drug allergy or significant drug interaction alert and make appropriate changes in

LCDR Nazzaro is Chief of the Pharmacy Service, NRMC Charleston, SC 29408. He is also program coordinator for the Tri-Service pharmacy computer project in the Charleston area.

medication, with prescriber approval, to prevent untoward episodes from occurring. The reviews also assist the pharmacy in counseling the patient as to proper medication scheduling.

Other files exist, which are common to all users. The doctor file aids in identifying a prescriber from another facility. Although each facility maintains a facility-specific drug inventory, the commonality of files allows a prescription to be refilled at any pharmacy regardless of where it had been originally filled within the region.

Refills constitute one-third of the daily outpatient workload at the main hospital's pharmacy; this averages 400 refills per day. The computer has improved the level of service based on its ability to schedule refill processing. With all prescription data filed on-line, there is no need for the pharmacy to have the container in hand when refilling the prescription. To obtain a refill, the patient telephones a request to the pharmacy 24 hours in advance. The call is received by an automatic telephone answering device. In all cases, the patient must give the pharmacy 24 hours notice to obtain a refill. The pharmacy then schedules the processing and filling of these refills at off-peak hours. This telephone ahead refill system has reduced the wait to zero.

The computer's speed and accuracy, coupled with a large bank of automated drug counting devices and the scheduling of refill processing, has reduced the patient's waiting time for a new prescription from one hour to approximately 20 minutes during peak workload times. And this has occurred while the average daily prescription volume has climbed from 850 to 1,200 prescriptions per day. An unanticipated benefit of low prescription waiting time has resulted in more prescriptions being picked up. Prior to this,

A patient's identity is verified at the "In-Window," and he is assigned a waiting number. If he has never been entered into the system, he is given a registration form to complete.

Personnel verify medication labels on the automated dispensing line.

Unit-Dose Issue and Processing.

three to five percent of all prescriptions were returned to the inventory. The "no-show" rate has now dropped to less than one-half of one percent.

The computer system has been functioning in the inpatient environment of the hospital since September 1978. It supports the centralized IV admixture service, which provides all IV solutions to the entire hospital. The computer is used for those floor stock items required daily within the institution.

Routine inpatient drug distribution for all wards except pediatrics and the surgical intensive care unit is a unit-dose system based on a 24-hour cassette exchange. Each inpatient order is clinically screened for drug allergies, drug interactions, and drug overlap. The resulting inpatient profile produces a medication distribution list (or "pick list") used by the technician to fill each cassette. The clarity, conciseness, and accuracy of this computer list allows the rapid expansion of unit-dose drug distribution with no increase in personnel.

The computer system provides each facility within the region with an inventory control far more comprehensive than can be accomplished manually. All order activity, outpatient or inpatient, is reconciled daily. As a result, the system provides the supply section with actual on-hand inventory levels, alerting supply when an item is low. This alert mechanism responds to sudden increases in demand and then compensates as the demand subsides. It is being used in three of the facilities to prepare the procurement document from which the user's medications are filled. An immediate benefit realized at this facility has been a reduction in total pharmacy expenditures. Although the outpatient prescription volume has increased by 15 percent in FY79 from FY78 and inpatient workload remained approximately the same, the pharmacy reduced total expenditures by $37,000 (3.4 percent of budget), a significant reduction in the face of rising medication costs.

Computerization of pharmaceutical services within NRMC Charleston has occurred in concert with other military facilities. This harmonious interservice working relationship has brought about an inproved level of pharmaceutical service to eligible health care recipients at all facilities within the region. The challenge to pharmacy to improve service in the face of personnel cutbacks has been met with the aid of computerization in a cost-effective manner and is highly supported by the users of the facilities. Further expansion of the computerization effort in other military facilities will improve the level of care offered by all military medical facilities. □

CAPOC—Managing the ECG

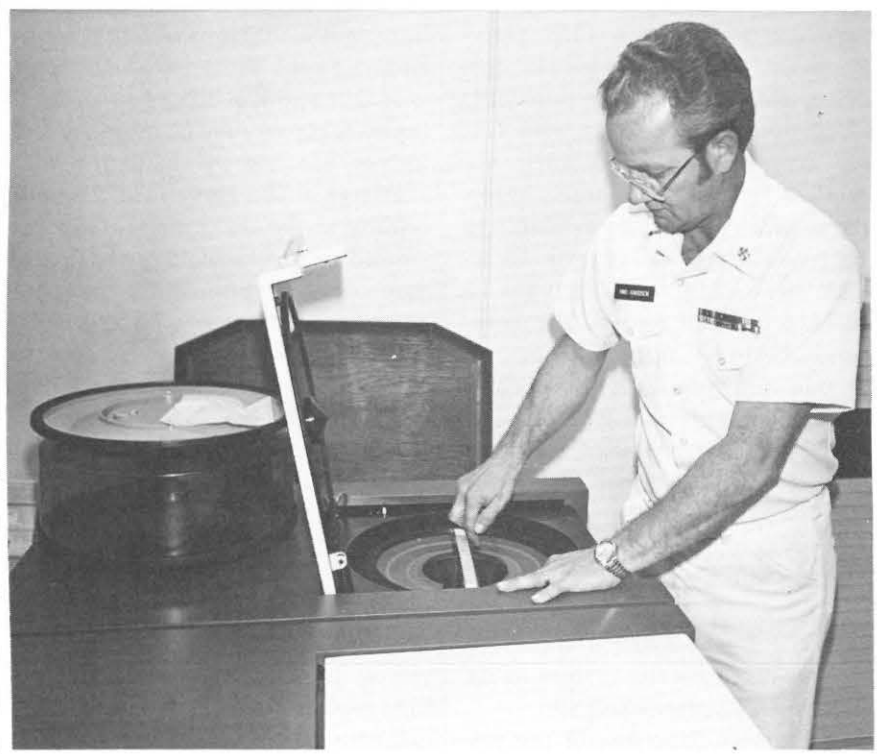
Nancy Bartczak
CAPT W.V.R. Viewig, MC, USN

Overflowing file rooms, a declining number of specialty physicians, the requirement to provide more services with fewer personnel—these represent some of the problems associated with managing the electrocardiogram (ECG). In response to these problems, the Computer Assisted Practice of Cardiology (CAPOC) Project provides automated storage and retrieval of ECG tracings and reports, the capability to share scarce cardiology resources within a region, and a management tool to cope with the high workloads and minimum staffing levels. These examples illustrate a few of the CAPOC capabilities which are the subject of this article.

The CAPOC Project is dedicated to ECG processing—with first priority given to input, interpretation, and output of preliminary ECG reports. The system operates 24 hours a day, 7 days a week, returning a preliminary report in 10 minutes. Approximately 150,000 ECG records are stored on-line, equivalent to one year's workload in a region. ECGs stored on the system prior to that time may be accessed by loading the appropriate historical file onto the system. Automated input, signal quality checking, measurement of ECG parameters, application of standard interpretive statements, preliminary report output, editing and certification, final report output, automated storage, on-line retrieval, and management reports are all provided by CAPOC.

CAPOC is the result of a tri-service, competitive procurement effort, which resulted in a July 1979 contract award to Marquette Electronics, Inc. CAPOC is fully supported by the TRIMIS Program Office, which provides funding and management for the project. TRIMIS funding support includes: regional data processing equipment, remote terminals and output devices, communications for all computer terminal link-ups, long-distance phone access for ECG input, maintenance, initial system training, and approved system modifications. TRIMIS management includes contract administration, software configuration control, documentation control, and ongoing training.

CAPOC exists as a functioning system at NRMC San Diego as well as 20 Navy and Air Force medical treatment facilities (MTFs) throughout southern California. The installation was completed in October 1979. By the end of 1980, 29 additional tri-service MTFs will be



Photos by HMC R.A. Heisler, USN

HMC R. Knudsen, NRMC San Diego, Cardiology Branch, loads CAPOC storage disk into the system. Each disk contains at least 70,000 complete ECG records, replacing rows of paper storage.

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supported in the Washington, DC, and San Antonio, TX, regions. The total CAPOC project, which is scheduled to be operational by April 1983, will consist of 15 CAPOC regions throughout the continental United States and Hawaii, providing automated support to 231 MTFs, including 79 Navy sites. Major Navy sites scheduled to receive CAPOC support by 1981 include NRMCs San Diego, Camp Pendleton, and Long Beach (operational); NNMC Bethesda (August 1980); NRMC Corpus Christi and NARMC Pensacola (September 1980); and NRMCs Portsmouth, VA and Camp Lejeune (April 1981).

The CAPOC project provides support on a regional basis, organized by geographic location. Each region includes one CAPOC Regional Computer Center (RCC), and from 6 to 22 overread and user sites which access the RCC for ECG support. The RCC houses all computer equipment to process the regional workload, including a PDP 11/34 processor, two 300 megabyte disk drives, communications equipment, a high-speed line printer, and system console. Overread sites are usually located at large MTFs where cardiologists are available to overread the CAPOC reports. Overread site equipment includes a writer/printer to receive the combined CAPOC tracing/report, a cathode ray tube (CRT) for communication with the RCC, and a teleprinter. The user site consists of a teleprinter terminal used for CAPOC report output (text only) and communication with the RCC. The user site may arrange for support from an overread site and receive a final, certified report or may interact with the system as an independent overreading site.

The system functions in the following manner. An ECG technician at a bedside or clinic prepares the patient and sets 22 digits of patient identification information on the three-channel, transmitting ECG cart. The technician initiates a call to the RCC and inputs 20 seconds of standard ECG data, as well as 10 seconds of rhythm data, if desired by the facility. The system checks for completeness of patient identification data, missing leads, baseline drift, excessive noise, or out-of-range voltages and returns a signal to the ECG cart to indicate whether the transmission was accepted or rejected. Once there is input to the system, the ECG is digitized and interpreted by application of the IBM-Bonner ECG Analysis Program, Version 2. If the ECG report is to be edited at an overread site, the preliminary report is output on the writer/printer. A single page provides both a compressed 10-second tracing, as received and stored by the computer, and the computer interpretation of the ECG. (The site may choose to output and store the full 20-second tracing, although 10 seconds is normally sufficient.) At the same time the report is output at the overread site, a preliminary report may be output at the user site, while the patient is still available at the clinic. The CAPOC reports at the overread site are reviewed by the cardiology staff, who may delete statements, indicate additional statements by specification of coded library statements (developed at NRMC San Diego), or add up to 200 characters of free text narrative. These changes are entered into the system from the CRT keyboard, displayed for verification, and certified by appending the overreading physician's name to the report. Once certified, the reports may not be changed, thereby providing permanent storage of the final report. The report is then automatically output at the printer associated with the originating location. If a user site is not associated with a large MTF for overread support, the preliminary report may be edited from the user site terminal or used as a "consult" by clinic physicians.

Many CAPOC benefits have been demonstrated at NRMC San Diego during the first six months of operation. Some of the major benefits are as follows:

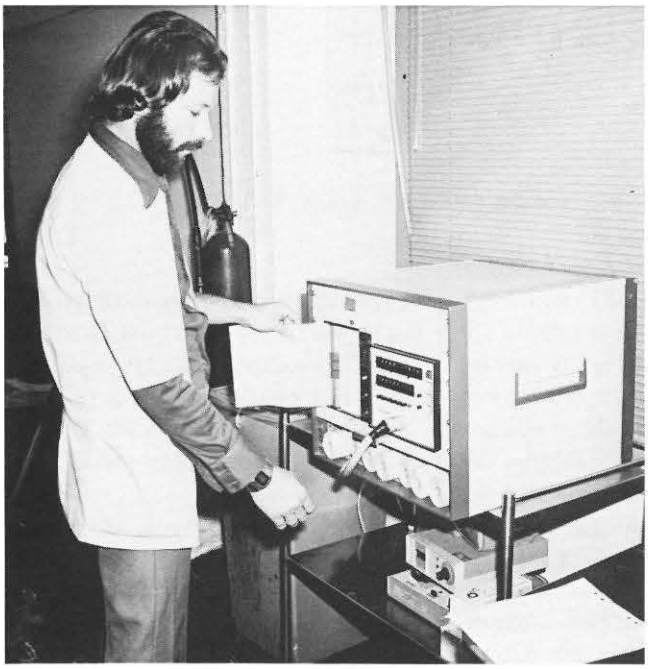
Teaching. At NRMC San Diego, the CAPOC system has proved an excellent teaching tool for interns, residents, and fellows. The computer measures ECG parameters more critically and provides an extensive series of diagnoses. These interpretations often stimulate consideration of diagnoses which may not have been considered in a manual mode. It also provides an exercise to determine reasons for the computer-generated interpretation.

Standardized Criteria. The CAPOC system has facilitated the development of standardized criteria which will be used at all military facilities throughout the U.S. This terminology exists in the form of the IBM-Bonner program statements and the user library developed for the editing process.

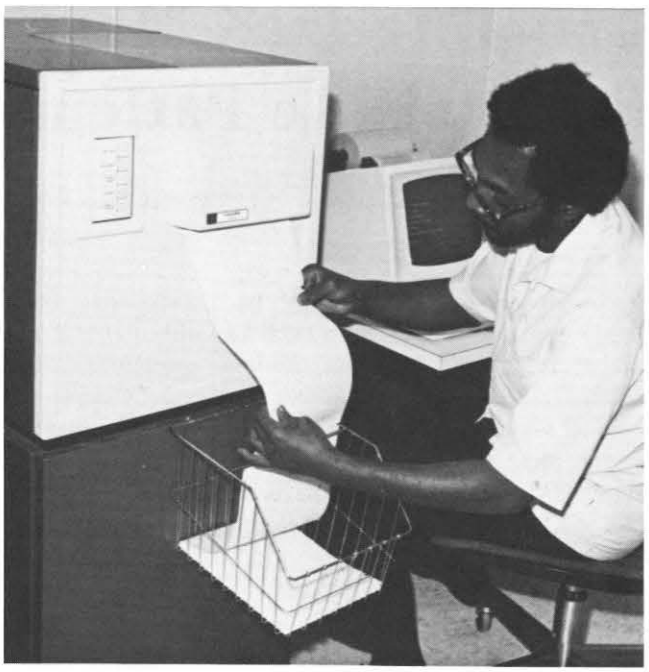
Report Format. CAPOC provides a clear, concise ECG report, both preliminary and final. The standard format is valuable to both the overreading staff and the requesting physician. At overread sites, the combined tracing/report is a significant improvement over previous report formats.

Signal Quality. Because the system checks the ECG signal at time of input, the system requires better quality ECGs; this occurs while the patient is available for a repeat tracing. This signal quality check may be overridden if special problems exist, but in general, CAPOC provides strict quality control of the ECG.

Record Storage. Perhaps the greatest impact of the CAPOC sys-



Input of ECG data to the CAPOC system. Switches on the front are used to input 22 digits of patient identification.



ECG technician at NRMC San Diego edits reports at the heart station overread terminal. Writer/printer at left produces the one-page ECG tracing and report.

tem results from the system storage capabilities. At NRMC San Diego, the final ECG report is returned to the requestor. No copies of paper records are filed in the Cardiology Department, with total reliance on the automatic storage. If past ECG records are required for a patient, a single retrieval request will indicate all ECGs on file for a given patient and selected ECGs (tracing and report) can be reproduced on demand. The computer files are copied daily to guard against loss of data due to system failure.

Remote Consultation. If a need for remote consultation exists, any overread site can retrieve a paper copy of the ECG tracing and report. This may alleviate the need for unnecessarily transporting a patient. In addition, ECGs which had been mailed to regional MTFs for overreading are now automatically transmitted to and returned from an overread site. This often reduces the turnaround at remote clinics by two to three days or more.

Record Transfer. The system provides the capability to transfer ECGs from one CAPOC region to another. All ECG data for specified active duty personnel and dependents from one region may be recorded on a floppy disk and mailed to the next duty station for input to another CAPOC system.

Management Reports. Current management reports include a listing of all ECGs to be overread and all ECGs input for a specified day. Future management reports will include workload reporting, disagreement with the program (to refine program criteria), and ECG cart performance.

Research. The CAPOC data base will be a valuable tool for cardiology research. By 1981, the capability to perform statistical searches of the data base will be available. Retrieval criteria may include one or a combination of the following: interpretive statement codes, age, height/weight, sex, medications, or inpatient/outpatient status.

The CAPOC system is not static. Continued refinement of capabilities and assessment of additional capabilities offered by Marquette will occur. Regional and national meetings will be held to discuss features which would improve CAPOC support for the end-user. At present, anticipated capabilities include serial analysis, revised ECG analysis software, digital transmission to improve signal quality, and increased on-line storage.

In closing, this article briefly summarizes CAPOC support. Many of the benefits of the CAPOC system will be demonstrated in the future, as CAPOC extends to a larger number of military MTFs. But as with any automated system, the full CAPOC potential will be realized as a result of the continued involvement, contribution, and support of CAPOC users. □

Computerized Management of the Diabetic Patient

LT James W. Jung, NC, USN LTJG Evelyn Deane, NC, USNR CDR Stephen B. Lewis, MC, USN

Managing the health care of patients with chronic diseases such as diabetes mellitus and maintaining their complete records present a dual challenge to medical officers and clinical staff. At NRMC Oakland, CA, the challenge has been met with the help of a team approach and a computer.

The team includes doctors, a diabetes nurse educator, who heads the computer program, two dietitians, two podiatrists, two specially trained corpsmen, and a computer aide.

Computer hardware consists of a 64-K minicomputer with two 80 million byte storage drives, and sufficient memory for 20,000 diabetic patient charts for 20 years. Patient history information (from an 11-page form), physical and laboratory data are stored on disks and instantly available as typed narrative copy by way of a high speed printer. By entering a patient's code number into the terminal, the entire clinical record is obtained in typed format.

Initially, the Central Appointments Desk sends the patient a cover letter explaining the computer program, a medical history questionnaire, a Hemoccult slide for stool sample, and two clinic appointment dates. At home, with access to any pertinent records and assistance from family members, the diabetic patient completes the questionnaire and brings it and the stool sample to the first clinic visit.

At this time, one of the corpsmen or the nurse educator explains the computer program and reviews the questionnaire with the patient. This serves three purposes. First, the review spots and fills in gaps. Second, the staff member clarifies unfamiliar terminology. Finally, the patient receives unhurried and undivided attention, and thus encourages communication and enhances compliance.

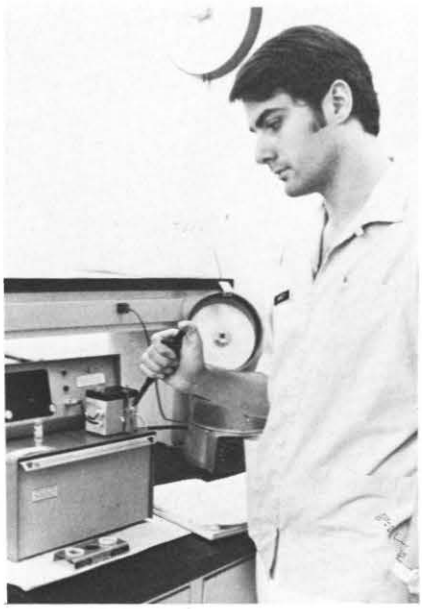
After the review, the same paramedical staff member collects fasting blood and urine samples to establish the laboratory data base (Table 1). If not contraindicated, a data base includes a chest x-ray and an electrocardiogram repeated every five years. Finally, a physical examination by a physician that includes a rectal examination concludes this visit.

A computer aid then enters the history, physical, and laboratory studies into the computer. Instant access to this formation is available in a legible printout, which becomes part of the patient's permanent record. Subsequent information can be added at any time. For initial and followup visits, the computer generates a compact "snapshot" summary of the laboratory data and diabetes treatment schedule that enables the physician to rapidly evalu-

TABLE 1. Initial Laboratory Profile

Complete blood count	Triglycerides
Erythrocyte sedimentation rate	Total cholesterol
Reticulocyte count	High density lipoprotein cholesterol
	Very low density lipoprotein cholesterol
Urinalysis (microscopic)	Low density lipoprotein cholesterol
Urine culture and sensitivity	Free insulin level
24-hour urine for glucose protein and creatinine	Thyroid studies: T3 resin (triiodothyronine resin uptake), and T3 (triiodothyronine) T4 (Thyroxine) and TSH (thyroid stimulating hormone) by radioimmunoassay
Hemoglobin (HB) A-1 expressed as % total HB	
Stool Guaiac	Electrocardiogram
	Chest x-ray
VDRL	
SMAC-20 (fasting)	

LT Jung is a registered nurse and is Diabetes Educator at NRMC Oakland, CA 94627. LTJG Deane is a staff nurse in the Labor and Delivery Ward, NRMC Oakland. Dr. Lewis is Director of the Clinical Investigation Center, NRMC Oakland.



HM3 Jack Barrett Operates a YSI Glucose Analyzer to determine blood glucose results.

ate patient progress. The record serves as a teaching tool readily available to medical students, nurses, and others following the patient's progress. It permits evaluation of treatment effectiveness, and, thereby, traces physician and patient accountability for the prescribed plan of care. We follow serum glucose, hemoglobin A1, 24-hour urine glucose/creatinine ratio to determine success of treatment schedule.

Copies of the record are easily obtained and time spent searching for a patient's chart and lab values is minimized. And each patient can have a personal copy, useful for filing insurance forms or when transferring to other health facilities. The record reinforces the relationship between strict blood glucose control and health maintenance. When presented to emergency room personnel by the diabetic patient, the computer copy provides a concise, legible history, physical, and laboratory profile for easy review.

Two weeks after the initial visit, the patient returns to the clinic. Typically, blood pressure, temperature, pulse, respiration, height, and weight are obtained. A finger-stick whole blood glucose is checked in 30 seconds using 25 microlites of blood injected into a Yellow Springs Instruments model 23A glucose analyzer. The physician reviews these results and the computer printout already in the chart. He notes any problems, brings them to the patient's attention, and outlines the proposed treatment plan. He emphasizes in order of importance, patient education, diet, testing urine and blood glucose, exercise, foot care, and medications.

The same day, the dietitian introduces patients to various diet plans, food exchanges, and menus. Using the computer printout, the dietitian spends less time taking a history, is able to design a diet emphasizing obvious problem areas, and has more time for counseling. Those patients who have not had diet counseling or recent instruction, receive dietary counseling during initial or followup visits.

If foot care is a problem, the patient sees a podiatrist, who not only treats the feet, but also teaches daily foot inspection and care. Followup appointments can be made directly with the podiatrist.

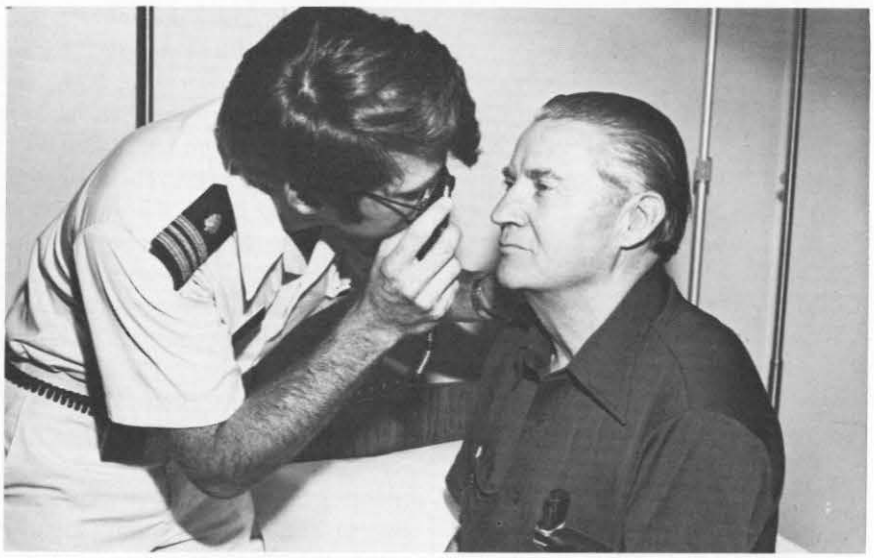
All new diabetics, all those beginning insulin therapy, or anyone with questions or in need of reinforced teaching, see the diabetes nurse educator. This nurse establishes a continuing relationship with the diabetic and begins patient education—the most important aspect of proper management—in the clinic. Patients are given booklets on diabetes mellitus and insulin. But, more importantly, the clinic patients are immediately enrolled in diabetes education classes that meet weekly. The computer printout allows the diabetes nurse educator to assess the patient in terms of self-care routine. Discrepancies are noted and discussed, and a plan of action developed with the patient. Subsequent followup information may indicate need for further education.

The physician determines the followup schedule after the second

Dietitian LT Sandra Hartman reviews diet plan with patient.

clinic visit based on control parameters. "Good Control" means a fasting blood glucose less than 140 mg/dl, a two-hour postprandial serum glucose of less than 200 mg/dl, Hgb A-1 less than 11 percent of total hemoglobin, and urine glucose (g) divided by urine creatinine (g) less than 5. Patients with good control do not return to the clinic for three to six months unless a medical problem arises. If these parameters are exceeded, control is considered "poor." These patients are closely followed by the physician, using more concerted effort to find causes for poor glucose control. Followups are scheduled one to seven days after clinics for patients with "very poor" control and one to two weeks afterward for those with "moderately poor" control. In every case, criteria are individualized and based on outstanding, additional problems such as pregnancy or impending surgery.

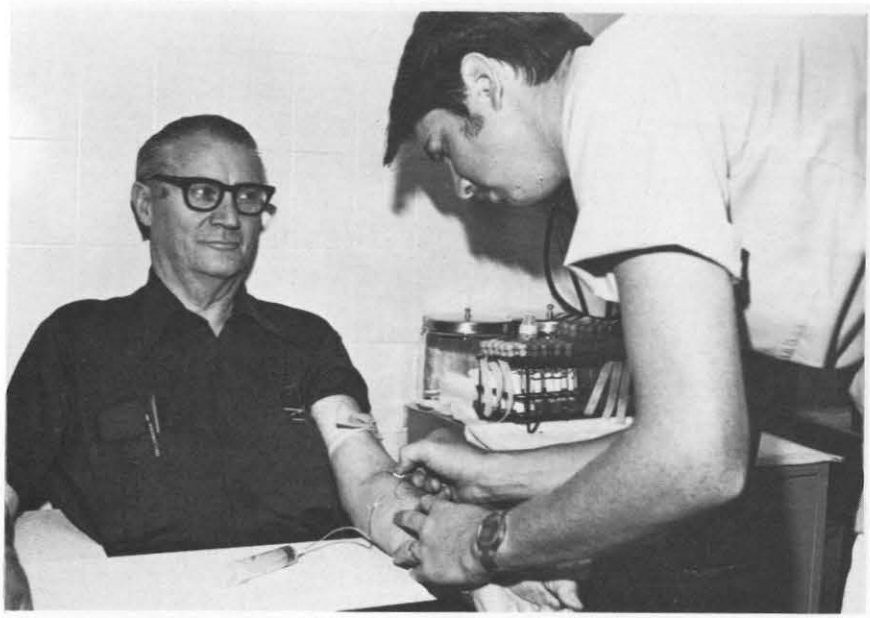
Every patient in the computer program receives a followup questionnaire from the physician to be returned one week prior to the followup appointment. This information is also entered into the computer and is available for review when the patient returns to the clinic.



LCDR Randy Howard examines patient's eyes during physical.

If a patient in the computer program requires hospitalization, the entire diabetic record is immediately available. Hospital staff involved in the patient's care by looking at the printed record appreciate what the patient's knowledge of diabetes may be, whether or not the patient has attended the diabetes classes, and what recurrent problems have been noted. The dietitian and nurse educator are especially helpful liaison and resource persons. They automatically follow all hospitalized diabetics and note specific education efforts in the chart and Kardex. Nursing staff can reinforce these efforts toward improving insulin injection skills, advancing knowledge of diet, and improving techniques for glucose testing of urine and blood. What the patient learns to do accurately not only encourages independence and compliance, but also enhances consistency of care during hospitalization and frees nursing and corps staff for other duties.

The use of the computer and the team concept described reduces physician time. A computerized data base allows stratification of patients into poor, fair, good, and excellent levels of glucose control enabling physician time and health care maintenance techniques to be focused on those diabetics with complications and those with inadequately controlled hyperglycemia. □



HM3 Kevin Garvin begins a patient's laboratory data base.

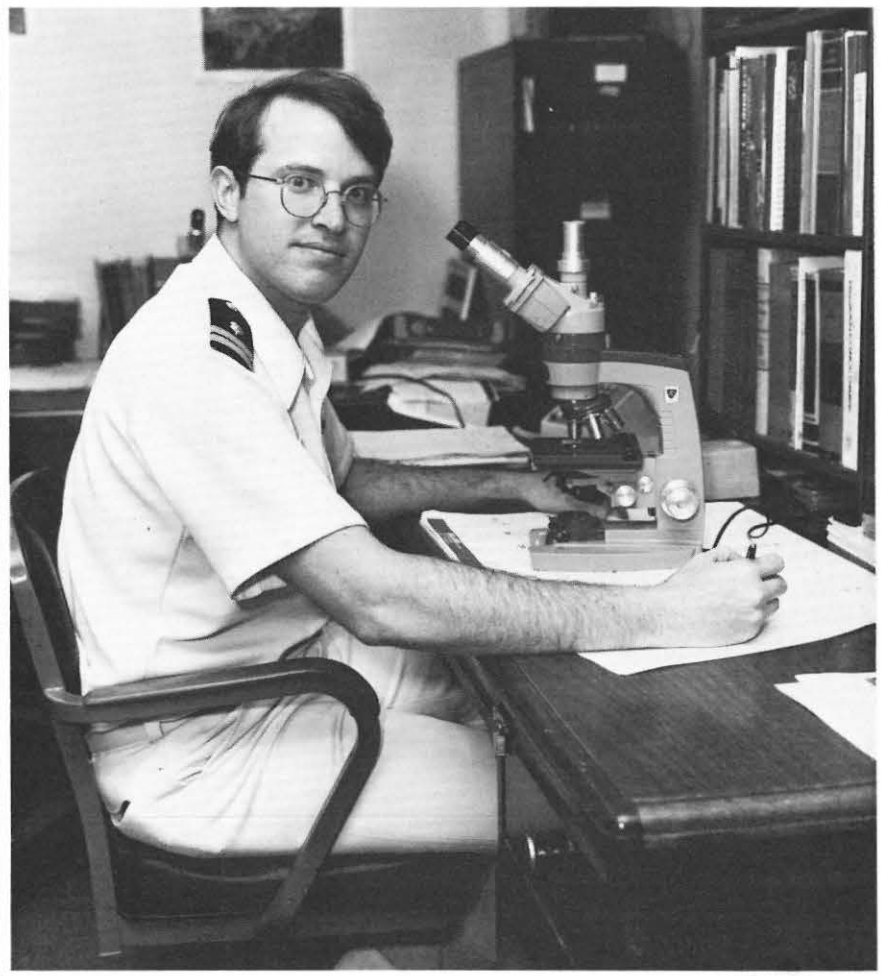
Legion of Merit for Bethesda Researcher

For his contribution to medicine that has been compared to Walter Reed's conquest of yellow fever, LT Robert Marshall Austin, MC, USN, was recently awarded the Legion of Merit, one of the Nation's highest awards.

Dr. Austin is a resident physician in pathology with the Laboratory Medicine Service at NNMC Bethesda, MD. Following the death of a military dependent child at a naval hospital in 1978, Dr. Austin recognized the possible relationship between the cause of death, diabetic ketoacidosis, and the flu-like illness that had affected this child as well as other children in this military community.

With the cooperative assistance of scientists at the National Institutes of Health, Dr. Austin began an exhaustive scientific investigation to determine the causal relationship between juvenile-onset diabetes and viral infections, which may affect not only children, but also military personnel. The outstanding scientific investigation by him and his associates culminated in the publication of a scientific report, "Viral-induced Diabetes Mellitus," in the *New England Journal of Medicine* on 24 May 1979. This exceptional scientific effort resulted in international interest and praise for the quality of research, for the report demonstrated for the first time in medical history that juvenile-onset diabetes in humans can be caused by a virus. Dr. Austin and his scientific associates were able to demonstrate the fulfillment of Koch's postulates by recovery of Coxsackievirus B-4 from the pancreas of those experimental animals using fluorescence-labeled antiviral antibody.

Dr. Austin's outstanding contribution to the advancement of medical knowledge has been recognized by acclamation of the Juvenile Diabetes Foundation and has stimulated interest and offered hope within the scientific community concerning the development of a vaccine that may protect susceptible individuals, including military personnel and their dependents, from those viral diseases which may result in juvenile-onset diabetes. At the present time, juvenile-onset diabetes affects more than 1.5 million Americans between infancy and age 40. This new insight concerning the causal relationship between viral diseases and juvenile-onset diabetes has offered optimism to the scientific community and has resulted in redirected efforts to develop a diabetes vaccine. This outstanding scientific discovery by Dr. Austin and his colleagues has particular military significance for it may be expected to result in further scientific advancements that will reduce morbidity and mortality, prevent complications of viral illnesses, and reduce the costs of health care among military personnel and their dependents. □



Dr. Austin

Photo by HM2 J. Parmenter

Navy Graduate Medical Education

Applications for Navy sponsored Graduate Medical Education (GME) are being sought for the 1981-1982 training year. BUMED Instruction 1520.10 series provides guidelines for submission of applications. Individual Navy GME programs and the number of positions available in each program appear on opposite page. In addition, a limited number of positions are available for specialty and subspecialty training in civilian institutions. These specialties are placed in order of priority according to the critical needs of the Navy Medical Department (Table 1).

Applications and general information about graduate medical education can be obtained by writing to: Commanding Officer, Naval Health Sciences Education and Training Command (ATTN: Code 4), National Naval Medical Center, Bethesda, MD 20014. Telephone: Commercial (202) 295-0648, 0649, Autovon 295-0648, 0649.

Specific information regarding individual training programs may be obtained by contacting the appropriate department chairman at the regional medical centers. Addresses of the teaching hospitals are listed below:

Multidiscipline
NNMC Bethesda, MD 20014
NRMC Oakland, CA 94627
NRMC Portsmouth, VA 23708
NRMC San Diego CA 92134

Family Practice
NRMC Camp Pendleton, CA 92055
NRMC Charleston, SC 29408
NRMC Jacksonville, FL 32214
NARMC Pensacola, FL 32512

Deadline for receipt of all applications in HSETC is 15 Aug 1980.

TABLE 1. Priority Specialty/Subspecialty Listing for Full-Time Outservice Training

1. Specialty and subspecialties of Orthopedic Surgery
2. Specialty of Anesthesiology
3. Aerospace Medicine
4. Emergency Medicine
5. Surgical specialties and subspecialties
   a. Plastic Surgery
   b. Neurosurgery
   c. Pediatric Surgery
6. Subspecialties of Internal Medicine
   a. Rheumatology
   b. Nephrology
   c. Tropical Medicine
   d. Infectious Disease
   e. Allergy/Immunology
7. Occupational Medicine
8. Preventive Medicine
9. Stress Physiology
10. Underwater Physiology
11. Physical Medicine
12. Rehabilitation Medicine
13. Ophthalmology subspecialties
14. Pediatric subspecialties
15. Obstetric/Gynecology subspecialties
16. Phychiatric subspecialties

NOTE: No. 5 and No. 6 receive equal consideration

Applicants for full-time outservice training are responsible for seeking and being accepted by the civilian institution.

Navy Residencies/Fellowships		Years of training offered	Number of Positions each year	Bethesda	Camp Pendleton	Charleston	Jacksonville	Oakland	Pensacola	Portsmouth, VA	San Diego
Aerospace Medicine	(1) *	3	3						3		
Anesthesiology	*	2/3	20	6				4		4	6
Dermatology	*	3	8	3							5
Family Practice	*	2/3	42		10	10	12		10		
Hand Surgery		1	2					2			
Internal Medicine	*	3	30	6				4		8	12
Cardiology		2	6	2							4
Endocrinology & Metabolism		2	3	2				1			
Gastroenterology		2	4	2							2
Hematology/Oncology		3	4	2							2
Infectious Disease		2	4	2							2
Nephrology		2	2							1	1
Pulmonary Disease		2	4	1						1	2
Neurology		3	3	3							
Neurosurgery	*	4	1	1							
Nuclear Medicine		2	3	2				1			
Obstetrics & Gynecology	*	3	18	3				3		6	6
Maternal Fetal		2	1	1							
Ophthalmology	*	3	9	4				2			3
Orthopedic Surgery	*	4	12	2				3		3	4
Otolaryngology	*	4	10	2				3		2	3
Pathology	*	4	10	3				2		2	3
Hematopathology		1	1	1							
Pediatrics	*	3	19	4				3		6	6
Plastic Surgery		2	1							1	
Psychiatry	*	3	15	4				3		4	4
Radiology (Diagnostic)	*	3	19	6				4			9
Radiology (Therapeutic)	*	3	1								1
Radiology fellowships	(2)	1	2								2
Surgery	*	4	14	3				3		4	4
Peripheral Vascular		1	1								1
Thoracic & CV Surgery		2	2	1							1
Urology	*	4	6	1				1		2	2

**Indicates number of years training beyond GME year one*

(1) One year outservice for Masters Degree and two years inservice—positions shown reflect inservice positions only

(2) Neuroradiology, Angiography, Pediatric Radiology, Ultrasound/Computed Tomography, and Nuclear Radiology—Only 2 fellowships will be filled each year

In addition to the above specialties, the Surgeon General has recently approved the establishment of training programs in the Following subspecialties: Adolescent Medicine—2-year program at San Diego (1 position at each year level), Rheumatology—2-year program at San Diego (1 position at each year level)

NOTES & ANNOUNCEMENTS

FORENSIC PATHOLOGY TRAINING

The Armed Forces Institute of Pathology (AFIP) will offer one year of advanced residency training in the special field of forensic pathology. The residency is available to active duty medical officers of the Army, Navy, and Air Force, who are either diplomates of the American Board of Pathology in anatomic pathology (preferably in both anatomic and clinical pathology), or eligible to take these examinations. There are positions available for the 1981-82 residency year.

Applications must be submitted by 15 Aug 1980 in accordance with BUMEDINST 1520.10G and BUMEDNOTE 1520.

Interested persons should contact: CAPT Robert L. Thompson, MC, USN, Department of Forensic Sciences, Armed Forces Institute of Pathology, Washington, DC 20306. Telephone: Autovon 291-3287, Commercial (202) 576-3287.

REVISED DENTAL COURSES

The following are newly revised correspondence courses for dental officers prepared by the National Naval Dental Center, Bethesda, MD, for the Bureau of Medicine and Surgery.

Endodontics (NAVEDTRA 10407C) is based on the text *Endodontic Therapy,* 2nd ed., by Franklin S. Weine, C.V. Mosby Company, 1976. The 8-assignment course covers diagnosis and treatment planning, pulp and periapical disease processes, nonsurgical and surgical treatment procedures, endodontic-periodontic therapy, and alternative treatment and restorative procedures.

Naval Reserve retirement credit is evaluated at 16 points.

Pharmacotherapeutics in Dental Practice (NAVEDTRA 13110-B) is based on the text *Clinical Pharmacology in Dental Practice,* 2nd ed., by S.V. Holroyd, C.V. Mosby Company, 1978. This 7-assignment course will emphasize pharmacology's practical importance in dentistry, provide information on drugs normally prescribed in dentistry, and for those drugs that are not normally prescribed, will discuss their effects on the dental patient and the dentist's role in the management of such patients, and serve as a quick and ready review for the busy clinician.

Naval Reserve retirement credit is evaluated at 14 points.

Officers who have completed one of the earlier editions of the above courses may enroll in the new course for additional credit.

For further information, write: Commanding Officer, National Naval Dental Center (Code 413), Bethesda, MD 20014.

HISTORICAL FUND

The Navy Medical Department Historical Fund was created to acquire and maintain items of historical significance to the Medical Department, including portraits designed to perpetuate the memory of distinguished members of the Medical Department. These memorials are displayed in BUMED and at NNMC Bethesda.

Active and inactive Medical Department personnel are invited to make voluntary contributions to the Fund. All monies received are deposited in Washington, DC, institutions to the credit of the Navy Medical Department Historical Fund and are subject to semiannual audit for correctness of receipt and disbursement. Expenditures are made as approved by the committee for its stated objectives. Since the last appeal of this nature in 1972, contributions have been infrequent and the resources of the Fund have dwindled to a level that precludes the accomplishment of approved projects.

If you wish to contribute, please send your check or money order (payable to Navy Medical Department Historical Fund) to Treasurer, Navy Medical Department Historical Fund, Bureau of Medicine and Surgery (Code 01B), Department of the Navy, Washington, DC 20372.

NRMC CORPUS CHRISTI RECEIVES AWARD

Following a recent survey by the Joint Commission on Accreditation of Hospitals (JCAH), NRMC Corpus Christi, TX, received the coveted two-year accreditation award. This is the highest accreditation status awarded by the commission. The Commanding Officer, CAPT T.J. Trumble, MC, expressed his appreciation for the many hours of hard work by physicians and staff in providing this high quality.

Accreditation is professional and national recognition reserved for facilities that provide high quality health care. It means that NRMC Corpus Christi voluntarily sought to be measured against the highest professional standards and is in substantial compliance with them.

CAPT Trumble says the JCAH Accreditation underscores the hospital's motto, "We care."

WANTED—ARTICLES AND PHOTOS

U.S. Navy Medicine has always encouraged our readers to submit articles in the areas of their expertise or experience. We are especially looking for articles relating to medical or dental research topics, surgical procedures, and office treatment techniques in any dental or medical specialty. We would also like good black-and-white photos to accompany those manuscripts.

VACANCIES IN GME PROGRAMS

The following Navy Graduate Medical Education specialty/subspecialty training programs have vacancies as indicated for the training year beginning July 1980. All the positions are at the first-year resident or fellow level. Interested Medical Corps officers may apply in accordance with BUMEDINST 1520.10G. For further information, write: Commanding Officer, Naval Health Sciences Education and Training Command, Attn: Code 4, National Naval Medical Center, Bethesda, MD 20014. Telephone: Autovon 295-0648, Commercial (202) 295-0648.

AMERICAN BOARD CERTIFICATIONS

(Subspecialties are indicated in parentheses)

American Board of Allergy and Immunology
LCDR L.J. Kanter, MC, USN

American Board of Dermatology
CDR W.D. Henrichs, MC, USN
(Dermatopathology)

American Board of Family Practice
LCDR R.B. Olsson, MC, USNR
LCDR R.B. Peterson, MC, USN
LCDR L.G. Ratcliff, MC, USNR
LT M.I. Hutchinson, MC, USNR

American Board of Otolaryngology
LCDR F.S. Curto, Jr., MC, USNR
LCDR J.G. Vap, MC, USNR

American Board of Pathology
LCDR M.L. Kleine, MC, USNR
LCDR M.B. Seaquist, MC, USN
LCDR T.R. Wade, MC, USNR
(Dermatopathology)

Residencies

Specialty	*Location*	*Year level*	*Vacancies*
Aerospace Medicine	NAVAEROSPMEDINST Pensacola	R-1	3
Nuclear Medicine	NAVREGMEDCEN Oakland	R-1	1
Otolaryngology	NATNAVMEDCEN Bethesda	R-1	1
Pathology	NAVREGMEDCEN Oakland	R-1	1
Psychiatry	NAVREGMEDCEN Oakland	R-1	1

Fellowships

Cardiology	NATNAVMEDCEN Bethesda	F-1	1
Endocrinology/ Metabolism	NATNAVMEDCEN Bethesda	F-1	2
	NAVREGMEDCEN Oakland	F-1	1
Gastroenterology	NATNAVMEDCEN Bethesda	F-1	2
Hematology/Oncology	NATNAVMEDCEN Bethesda	F-1	1
Infectious Disease	NATNAVMEDCEN Bethesda	F-1	1
Maternal/Fetal Med	NATNAVMEDCEN Bethesda	F-1	1
Plastic Surgery	NAVREGMEDCEN Portsmouth	F-1	1
Pulmonary Disease	NATNAVMEDCEN Bethesda	F-1	1
Radiation Oncology	NAVREGMEDCEN San Diego	F-1	1
Thoracic Surgery	NATNAVMEDCEN Bethesda	F-1	1

Angels of Bataan Remembered

Toshio Tesukagoshi, a member of the Japanese House of Representatives, stood solemnly at the bottom of the stairs leading to the large, white Altar of Valor at Mount Samat, Bataan, Republic of the Philippines, on 9 April 1980.

To his left, right, and behind him stood other Japanese visitors, many of whom share his vivid memories of the events that took place in this area over 38 years ago. Then, LT Tesukagoshi of the Imperial Japanese Army came to the Philippines with the invading Japanese ground forces.

On 9 April 1942, the American and Filipino defenders of Bataan surrendered to the enemy. Less than a month later, on 6 May 1942, Corregidor fell.

Tesukagoshi and the 44 members of his group came to take part in the annual "Reunion For Peace" held in memory of their dead comrades-in-arms, as well as the 91,000 American and Filipino servicemen and women who saw action at Bataan and Corregidor.

Among those honored at the Mount Samat rites were the "Angels of Bataan"—11 U.S. Navy and 90 Army nurses—who were ordered into the Philippines by GEN Douglas MacArthur. They were taken prisoner following the fall of Bataan and Corregidor.

Sixteen of the surviving Angels were present at Mount Samat to witness the unveiling of a bronze plaque dedicated to their valiant efforts in saving lives during a time of great death.

One of the Angels, retired Army LCOL Hattie Brantley of Jefferson, TX, recalled her capture and the fall of Corregidor. "At the time [6 May 1942], I had been in the Army three years and was a second lieutenant when the Japanese took us prisoner. We were taken to Santo Tomas and later to Los Banos after the fall of Corregidor where we remained until our rescue—3 Feb 1945." Hattie had no thought of capture at the time. "I had all the faith in the United States and never thought the Japanese would overrun us," she said.

Toshio Tesukagoshi is escorted to the Altar of Valor at Mount Samat, Bataan.

The nurses stayed in the Philippines for a short while after their liberation before returning to the U.S. for discharge or continuation of military service.

Seventy-five nurses walked away from prison. Their successful struggle with life as POWs and their professional dedication in the face of death led GEN George Marshall to say, "Their devotion to duty will be an inspiration to all women."

Truly, they are the "Angels of Bataan."

—Story and photos by JO1 Balquien F. Valdez, USN □

Former POWs attend the unveiling of a plaque honoring their valiant efforts as nurses in the Philippines before and after the fall of Bataan and Corregidor. Seventy-five Angels are still alive.

BUMED SITREP

PATIENT "HOTLINES"

There are some medical facilities which have begun programs that handle "patient complaints/problems." Strategically placed signs on or near front desks and appointment desks provide the names of the appropriate people and their phone numbers to contact if there are any complaints or comments about the treatment or care received. This system is an excellent way for promoting good relations between the individual medical facility and its beneficiary public. It projects a caring attitude, one which should be inherent in all Navy medical centers and clinics. If your facility does not have a patient affairs "hot line" or some other avenue for communication, it may be worth looking into.

STANDARDS OF CONDUCT AND OFF-DUTY EMPLOYMENT

All active duty Navy members are reminded they are in a 24-hour-a-day duty status and that their military duties take precedence on their time, talents, and attention at all times. Consistent with that fundamental premise, however, it is a Navy policy that personnel should not be restrained from engaging in legitimate and ethical civilian employment during off-duty hours so long as it does not interfere with their military duties. CNO has recently requested that these points be reemphasized.

Navy men and women may not engage in *any* activity, whether on duty or off, that reflects discredit upon the Navy. Paragraph 6.m of SECNAVINST 5370.2G promulgates standards of conduct with respect to off-duty employment. Subparagraph (1) thereof is quoted in its entirety as follows:

"(1) Naval personnel shall not engage in outside employment or other outside activity, with or without compensation, that:

(a) Interferes with, or is not compatible with, the performance of their Government duties;

(b) may reasonably be expected to bring discredit on the Government or the Department of the Navy; or

(c) is otherwise inconsistent with the requirements of this instruction, including the requirements to avoid actions and situations which reasonably can be expected to create the appearance of conflicts of interests."

In addition, specific regulations relating to Medical Department officers are found at MANMED art. 1-22.

You should also be aware of the provisions of the Navy Uniform Regulations which prohibit the wearing of the Navy uniform under circumstances which tend to bring discredit upon the Armed Forces.

CNO expects each of us to counsel our subordinates and remind them of the dignity of their profession and the traditions of honor, service, and sacrifice that are reflected in the standards of conduct applicable to all who are privileged to wear the Navy uniform. They must fully appreciate that those standards are high and necessarily more rigid than those imposed by other less demanding professions. It is inappropriate for Navy members to accept off-duty employment, with or without compensation, that involves unethical, immoral, or obscene conduct. Such inappropriate employment clearly includes any commercial posing or dancing in the nude or suggestively covered by recognizable items of the Navy uniform or the selling or promotion of pornographic materials. Involvement of Navy personnel in such activities could constitute a violation of either the Uniform Code of Military Justice or other applicable regulations, or both, and it must not be condoned.

MEDICO-LEGAL FEEDBACK: IMPROPER PRESCRIPTIONS CAUSE LEGAL DIFFICULTIES

Failure to follow proper prescription procedures has led a number of officers into a legal thicket. Such practices as writing a prescription for twice the actual dose or writing an identical prescription for the patient's spouse to circumvent a one-month's-dose limitation, for example, are often intended as an expediency for the patient. The problem, however, is that rather than doing the patient a favor, such actions may in fact be harmful: they may contribute to drug dependence or accidental death by overdose.

Other loose practices include writing prescriptions for controlled drugs for members or their families based upon their representations of need for same or writing for a patient without actually examining him/her and making entries in the medical record (the proverbial "hallway consult").

Some medical officers have been duped into unwitting contribution to patient's addiction or trafficking in drugs. When an NIS investigation and criminal charges against the physician results, the expendiency of the variant prescription practices somehow pales to insignificance.

All commands should strive to educate medical personnel concerning proper methods of prescribing and dispensing medications.

Attention Dental Professionals:

Don't just tell them to quit...

Studies confirm that 9 out of 10 smokers know that smoking is a bad habit. And they'd like to quit. But they don't know how.

The large majority of smokers indicate they would quit if their doctors told them to.

And studies confirm that a large proportion of patients have quit upon advice from their doctors.

However, a lot of smokers report that they've never received advice on quitting from their dental professional. It could be their dentist, hygienist and/or assistant doesn't want to push them. Or maybe quitting is given a lower priority in patient education.

But we believe a lot of dental professionals don't tell their patients to quit smoking for one simple reason: they don't know how to answer the inevitable "how."

The American Dental Association and the National Cancer Institute have developed a free *Let's Help Smokers Quit* kit to help you answer the "how" and to help your patients quit the smoking habit. The kit has been tested by the Colorado Dental Association and has been proven to be effective.

The American Dental Association and the National Cancer Institute will provide the *Let's Help Smokers Quit* kit free of charge to all dental professionals who want to participate in this important effort. Included in the kit are guidelines for the dental professional, a self-test to help smoking patients determine why they smoke, pamphlets with tips on quitting, and waiting room posters to introduce the subject. Each kit contains enough materials to help 50 of your smoking patients who want to quit.

Show them how to quit.

Don't delay! To receive the American Dental Association and the National Cancer Institute's free *Let's Help Smokers Quit* kit, fill out this order form and return it today.

Part of the Navy "Clearing the Air" Program. (NaCAP)

National Cancer Institute

Department of the Navy

American Dental Association

I don't want to just tell them to quit.
I want to show them how to quit.
Please send me my free *Let's Help Smokers Quit* kit today.

Name _____

Address _____

City _____ State _____ Zip _____

Mail to:
Let's Help Smokers Quit
Office of Cancer Communications
Building 31, Room 10A18
Bethesda, Maryland 20205

Attention Physicians:

Don't just tell them to quit...

Studies confirm that 9 out of 10 smokers know that smoking is a bad habit. And they'd like to quit. But they don't know how.

The large majority of smokers indicate they would quit if their doctors told them to.

And studies confirm that a large proportion of patients have quit upon advice from their doctors.

However, about two-thirds of smokers report that they've never received advice on quitting from their doctors. It could be their doctors don't want to push them. Or maybe quitting is given a lower priority than other health problems.

But we believe a lot of doctors don't tell their patients to quit smoking for one simple reason: they don't know how to answer the inevitable "how."

The National Cancer Institute has developed a free "Helping Smokers Quit" kit to help you answer the "how" and to help your patients quit the smoking habit. Materials for this kit were pretested with the cooperation of the Harris County (Texas) Medical Society and M.D. Anderson Hospital and Tumor Institute in Houston, Texas.

The National Cancer Institute will provide the "Helping Smokers Quit" kit free of charge to all physicians who want to participate in this important effort. Included in the kit are guidelines for physicians, a self-test to help smoking patients determine why they smoke, pamphlets with tips on quitting, and waiting room posters to introduce the subject. Each kit contains enough materials to help 50 of your smoking patients who want to quit.

Show them how to quit.

Don't delay! To receive the National Cancer Institute's free "Helping Smokers Quit" kit, fill out this order form and return it today.

Part of the Navy "Clearing the Air" Program (NaCAP)

Department of the Navy

National Cancer Institute

I don't want to just tell them to quit.
I want to show them how to quit.
Please send me my free "Helping Smokers Quit" kit today.

Name _____

Address _____

City _____ State _____ Zip _____

Mail to "Helping Smokers Quit" Kit
Box NaCAP
National Cancer Institute
Bethesda, MD 20205

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